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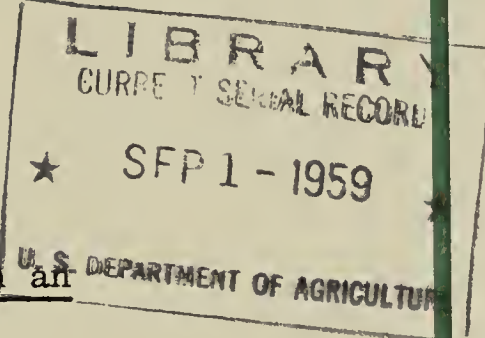
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# TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION  
U.S. DEPARTMENT OF AGRICULTURE · · FOREST SERVICE

No. 560



Heavy Thinning Increases Tree Size and Yield in an  
Upper Michigan Northern Hardwood Pole Stand

Studies in several timber types have shown that light thinnings do not appreciably change the total volume growth per acre but rather reduce the number of trees on which it occurs. These thinnings usually remove the low-quality and poor-risk trees. Similar results recently were observed 9 years after heavy thinning in a pole stand of northern hardwoods. Shortly after cutting by the farm owner, study plots were established. Similar plots were installed in a nearly comparable adjacent unthinned stand. These even-aged stands had developed after a commercial clear cut in 1921. Trees up to 13 inches in diameter at breast height were present, and the average stand diameter (of trees 3 inches and larger) was 4.5 inches. The composition was primarily sugar maple with some elm and ironwood (eastern hophornbeam). Other minor species were cherry, yellow birch, aspen, and basswood.

This thinning, 25 years after clear cutting, left the residual trees uniformly spaced over the area. Approximately  $6\frac{1}{2}$  cords per acre of chemical wood and fuelwood were removed by utilizing products to a 2-inch top. This cut removed 33 percent of the basal area and 32 percent of the cubic volume.

Although the annual net increase in volume per acre in the thinned stand is only slightly greater than in the unthinned stand (table 1 on back of sheet), it is accumulating on fewer and larger trees. In 9 years, the average diameter in the unthinned stand has increased only 1.0 inch compared to an increase of 1.5 inches in the thinned stand. In the unthinned stand the increase in basal area was less but height growth was greater so that the increase in volume was nearly the same on both areas.

Besides concentrating the growth on fewer trees per acre, this thinning also utilized many trees that otherwise might have been lost as mortality. The residual stand will yield larger products in a shorter period due to increased individual tree growth. Other studies have indicated that heavy cuttings may reduce individual tree quality. In this study no measure of tree quality is available, but early crown closure is believed to have minimized any losses in quality due to epicormic branching. To ensure an early crown closure, a sufficient number of trees should be left uniformly spaced over the area. Even in this heavy thinning there was a need to leave trees that were not of final crop-tree quality.

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Table 1.--Comparison of young thinned and unthinned northern hardwood stands immediately after cutting and 9 years later; trees 3 inches d.b.h. and larger per acre

Treatment and year	Trees	Average diameter	Basal area	Volume	
	<u>Number</u>	<u>Inches</u>	<u>Sq. ft.</u>	<u>Cu. ft.</u>	<u>Cords</u>
Unthinned:					
1946	787	4.9	101	1,842	26
1955	697	5.9	132	3,085	44
Net change:					
In 9 years	-90	1.0	31	1,243	18
Ave./year	-10	.11	3.4	138	2.0
Thinned:					
1946	381	4.7	46	859	12
1955	436	6.2	93	2,165	31
Net change:					
In 9 years	55	1.5	47	1,306	19
Ave./year	6	.17	5.2	145	2.1